



APPLICATION SPECIFICATION

TITLE

MOLEX ON-METAL EXTERNAL WI-FI DUAL-BAND ANTENNA

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DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2158680001	Trista Zhang 2021/07/14	Cheng Kang 2021/07/15	Andy Zhang 2021/07/15



APPLICATION SPECIFICATION

MOLEX ON-METAL EXTERNAL WI-FI DUAL-BAND ANTENNA

1.0 SCOPE

This specification describes the antenna application and surrounding. The information in this document is for reference and benchmark purposes only. The user is responsible for validating antenna RF performance based on the user's actual implementation.

Antenna illustrations in this document are generic representations. They are not intended to be an image of any antenna listed in the scope.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER (S)

Product name: Molex on-metal external Wi-Fi dual-band antenna

Series Number: 215868 Series

2.2 DESCRIPTION

Series 215868 is an external antenna covering frequency range of 2.4~2.5GHz and 5.15~5.85GHz. Series 215868 is designed for the application of mounting on the metal surface and providing excellent RF performance.

2.3 PRODUCT STRUCTURE INFORMATION

Please refer to PS-2158680001 for full information.



ANTENNA PHOTOGRAPH

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3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing (SD)	SD-2158680001	Mechanical Dimension of the product
Product Specification (PS)	PS-2158680001	Product Specification
Packing Drawing (PK)	PK-2158680001	Product packaging specifications

4.0 ANTENNA PERFORMANCE

4.1 RF TEST CONDITIONS

All measurements are done of the antenna mounted on the center of reference metal surface which size is 160mm*112mm with VNA Agilent E5071C and Over-The-Air (OTA) chamber. All measurements in this document are done with the part No.2158680001 with a cable length of 300mm. The recommended applications are as shown in figure 4.1.1 and figure 4.1.2.

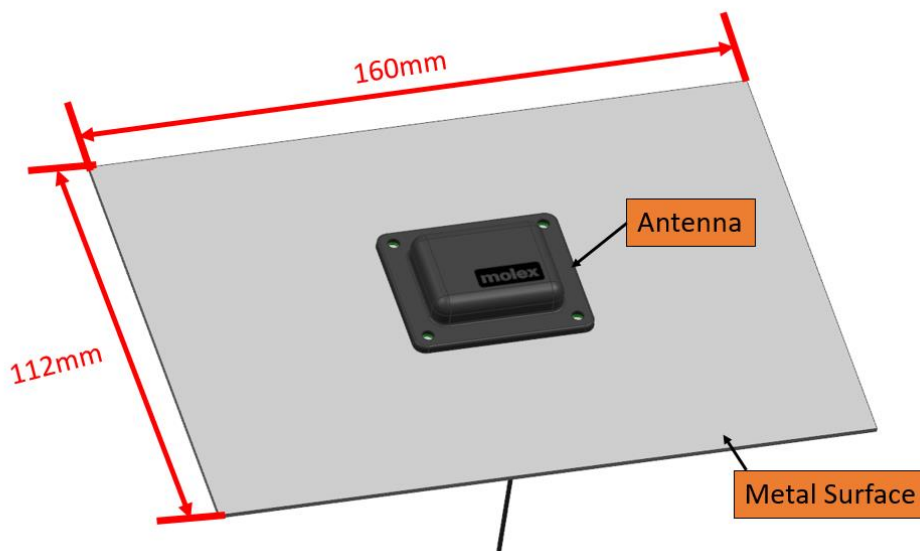


FIGURE 4.1.1 ANTENNA MOUNTED ON THE CENTER OF REFERENCE METAL SURFACE WHICH SIZE IS 160MM*112MM

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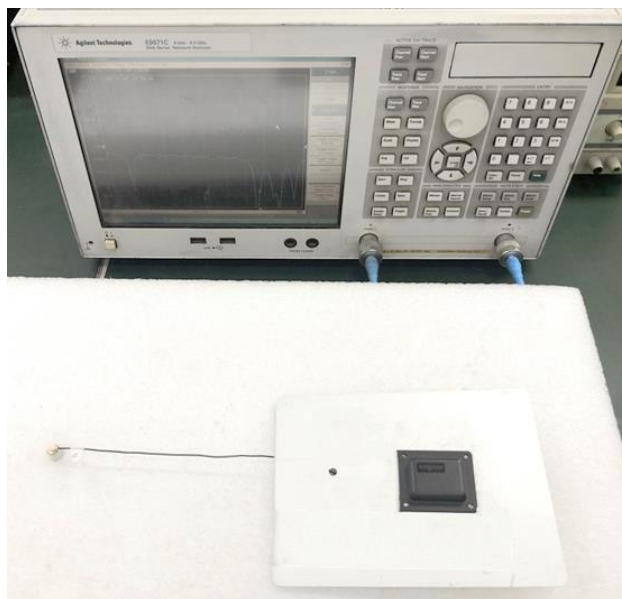


FIGURE4.1.2 ANTENNA TEST PICTURE WITH VNA AGILENT E5071C



FIGURE4.1.3 ANTENNA TEST PICTURE WITH OTA CHAMBER

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4.2 ANTENNA PERFORMANCE

Description	Equipment	Requirement (Cable Length:300mm)	
		2.4-2.485GHz	5.15-5.85GHz
Frequency Range	VNA E5071C	2.4-2.485GHz	5.15-5.85GHz
Return Loss	VNA E5071C	< -6dB	< -6dB
Peak Gain (Max)	OTA Chamber	1.8dBi	5.5dBi
Average Total Efficiency	OTA Chamber	> 50%	>45%
Polarization	OTA Chamber	Linear	
Input Impedance	VNA E5071C	50 Ohms	

Note that the above antenna performance is measured with the antenna mounted on the center of reference metal surface which size is 160*112mm with VNA Agilent E5071C and Over-The-Air (OTA) chamber. When implement into the system, the frequency resonant might be off-tune due to the loading of surrounding components especially metal plane. This off-tune can be compensated through matching. Although module manufacturers specify a peak gain limit, it is based on free-space conditions. The peak gain will be degraded by 1 to 2dBi in the actual implementation as the radiation pattern will change due to the surround components. As such, during selection of antenna, you can select one with high peak gain to compensate for the loss. Molex can offer assistant to choose the best location and best tuning in-order to meet this peak gain requirement.

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4.3 RETURN LOSS PLOT

All measurements in this document are done with antenna mounted on the center of reference metal surface which size is 160mm*112mm, with cable length of 300mm.

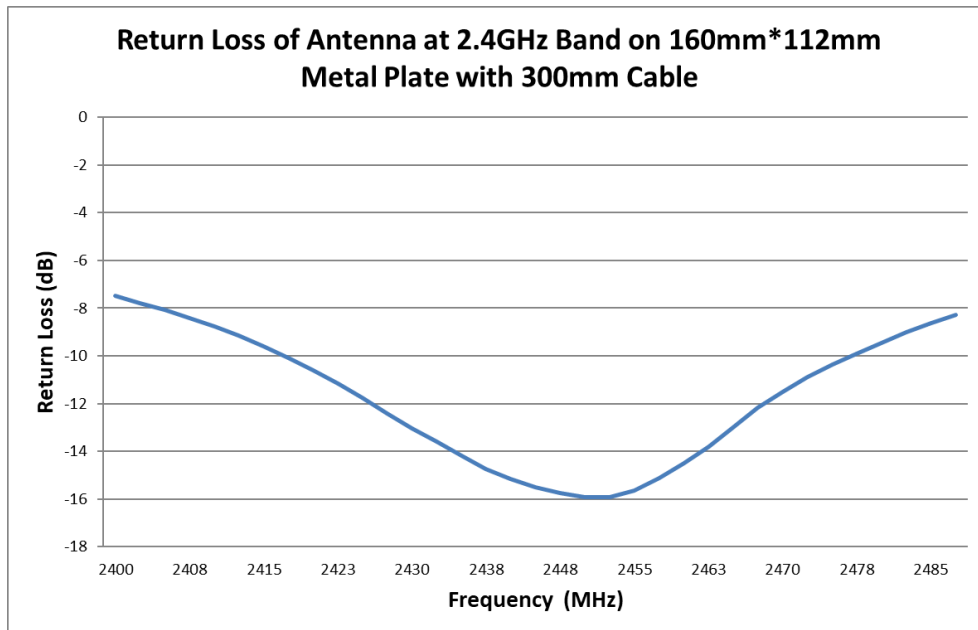


FIGURE 4.3.1 RETURN LOSS OF ANTENNA AT 2.4GHZ BAND

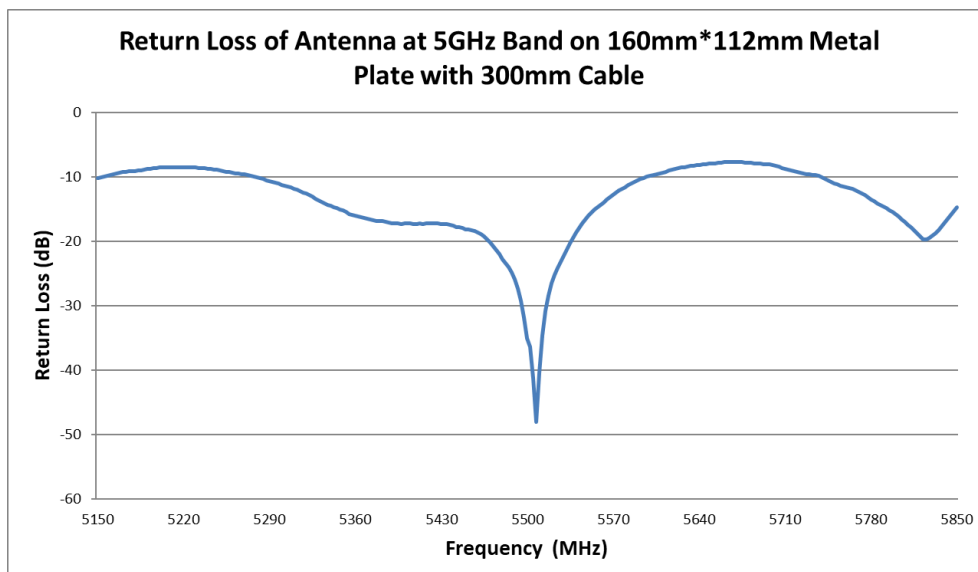


FIGURE 4.3.2 RETURN LOSS OF ANTENNA AT 5GHZ BAND

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4.4 EFFICIENCY PLOT

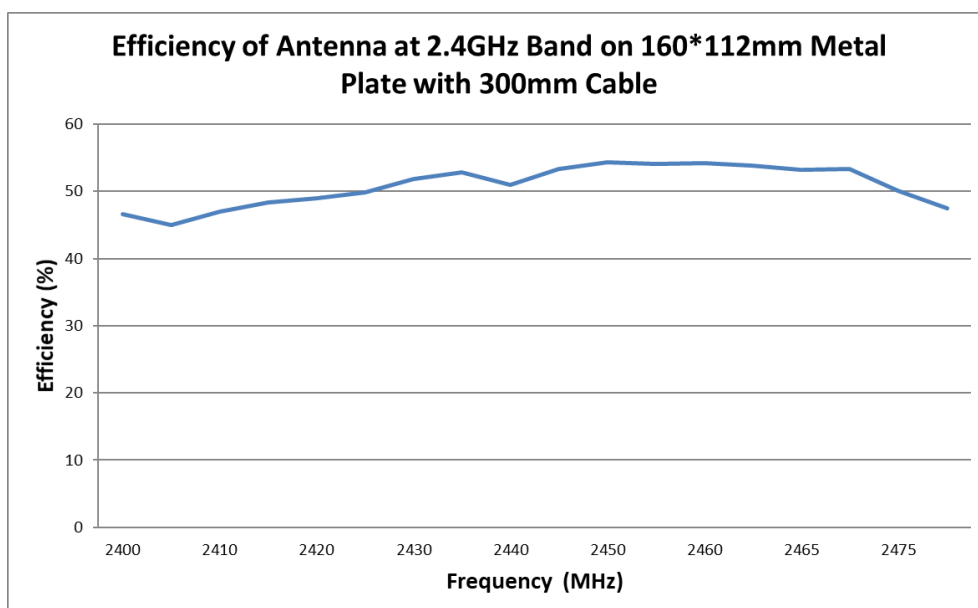


FIGURE 4.4.1 EFFICIENCY OF ANTENNA AT 2.4GHZ BAND

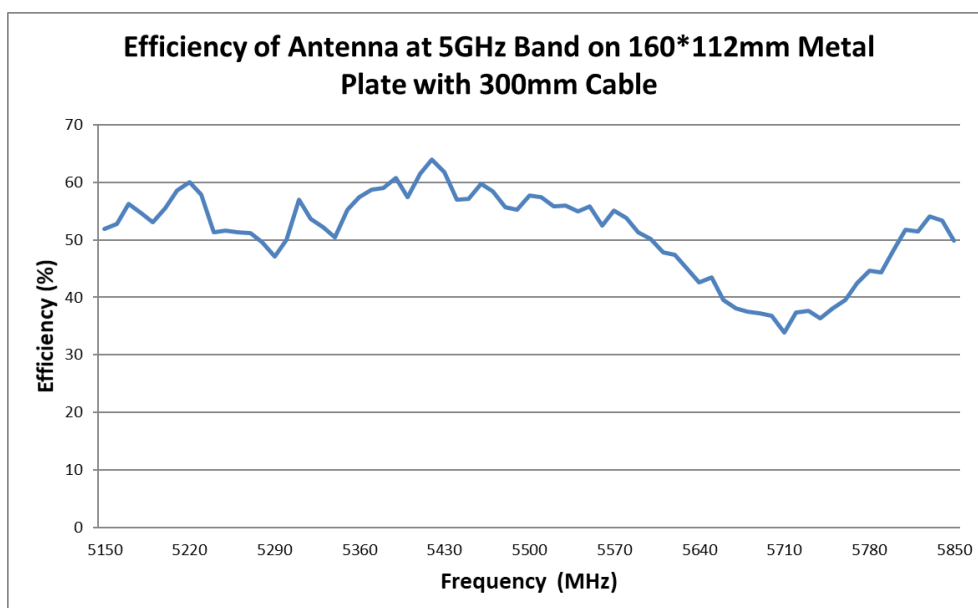


FIGURE 4.4.2 EFFICIENCY OF ANTENNA AT 5GHZ BAND

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4.5 2D RADIATION PATTERN

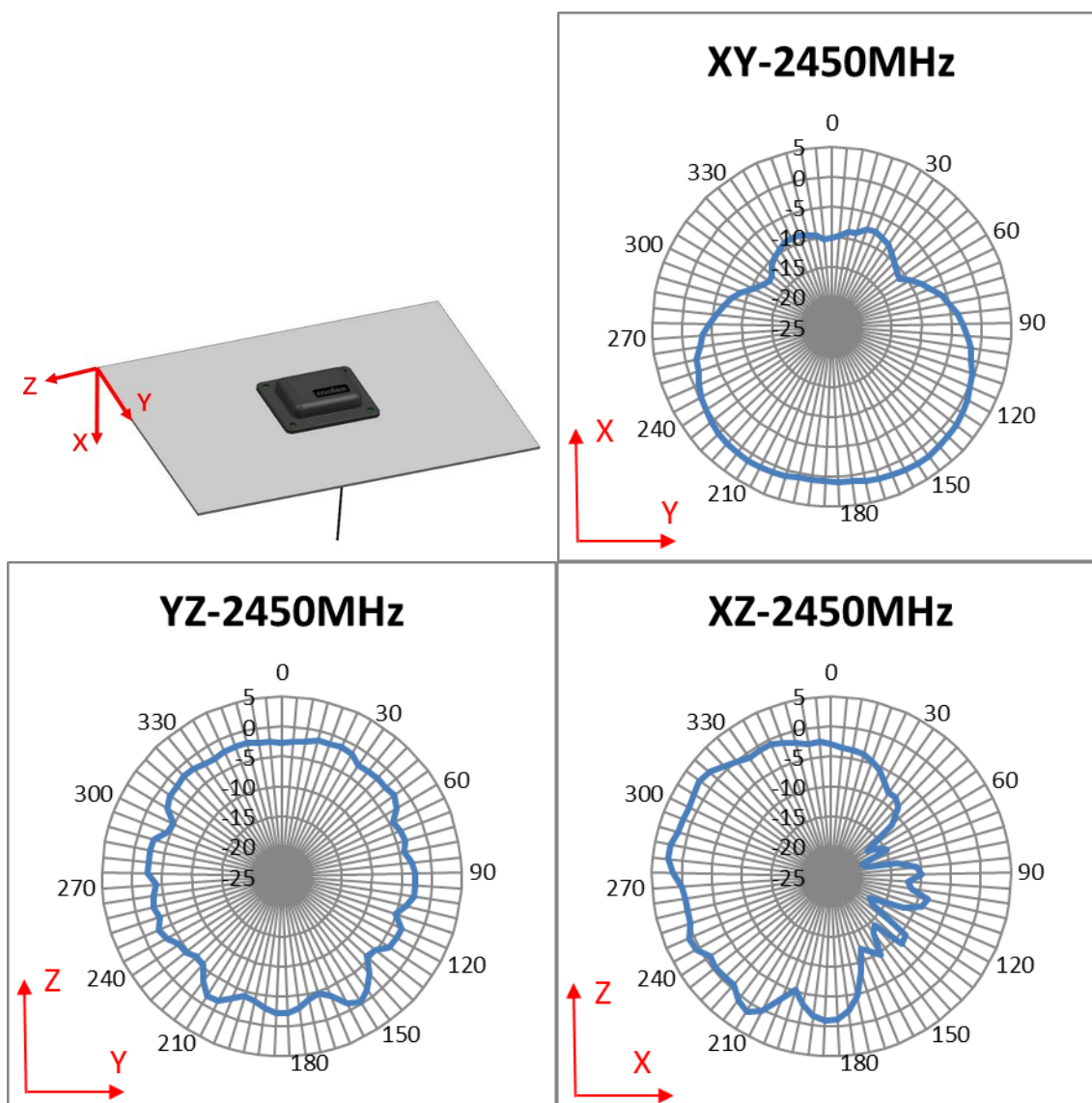


FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA

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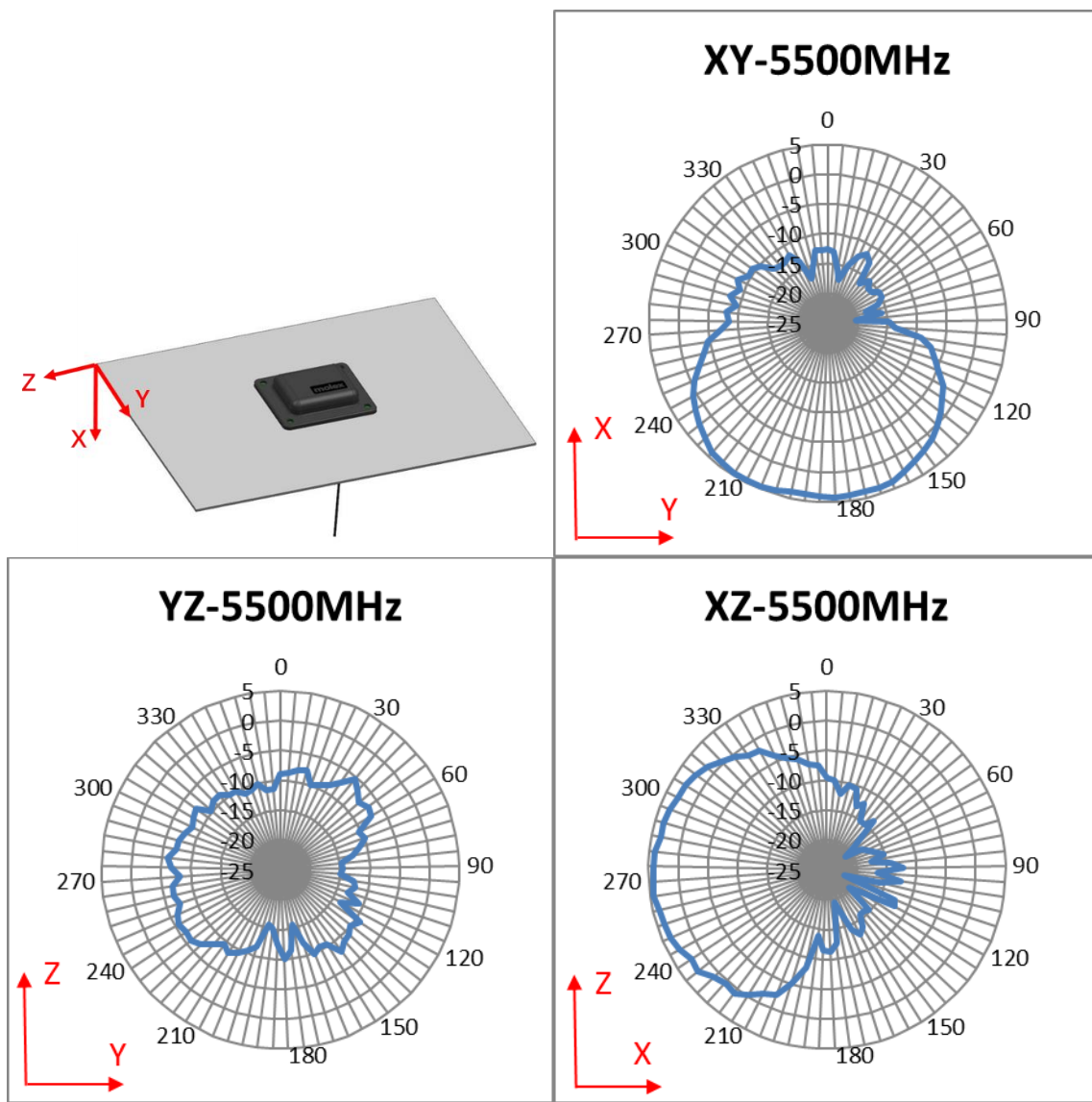


FIGURE 4.5.2 2D RADIATION PATTERN OF ANTENNA

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4.6 3D RADIATION PATTERN

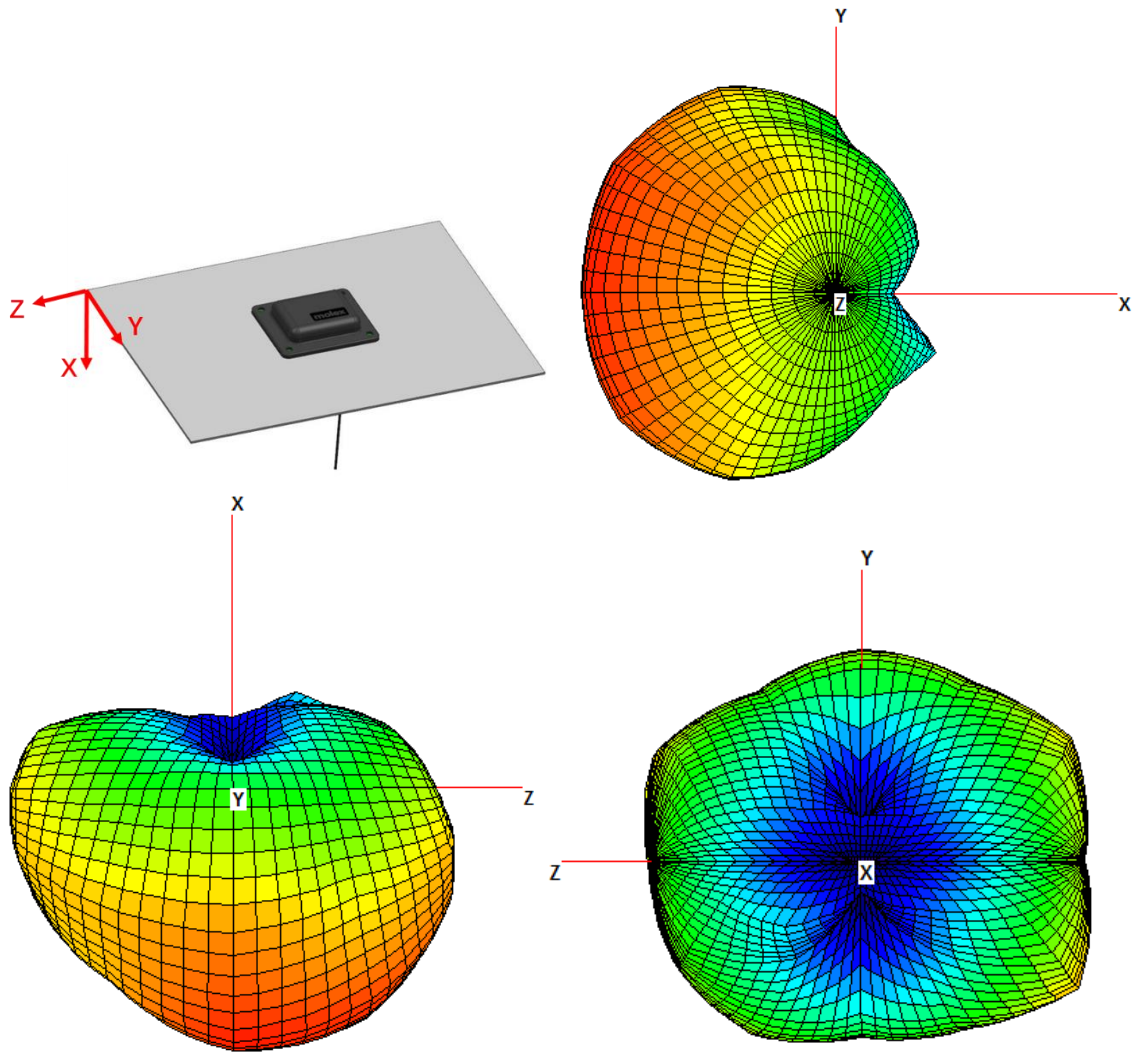


FIGURE 4.6.1 3D RADIATION PATTERN OF ANTENNA AT 2450MHZ

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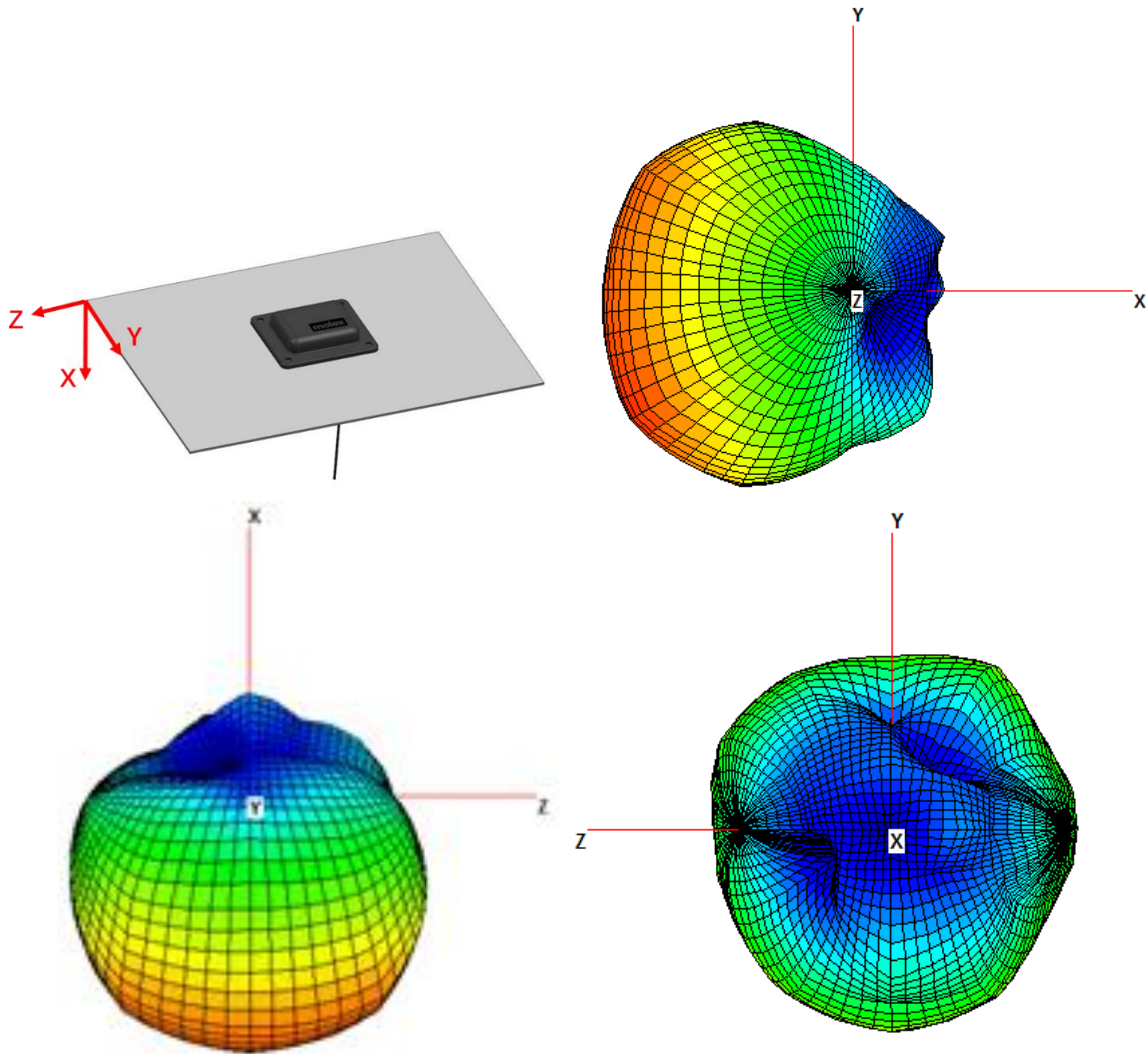


FIGURE 4.6.2 3D RADIATION PATTERN OF ANTENNA AT 5500MHZ

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5.0 ASSEMBLY GUIDELINE

The antenna uses HE-5904G adhesive on the reverse side of the antenna section. HE-5904G is a 0.4mm thickness gray acrylic foam tape which has very high bonding strength. It is suitable for bonding a variety of substrates, including sealed wood, many plastics, composites and metal. The surface should be smooth with $Ra < 1.6 \mu m$ and need to clean the surface before sticking this product. The antenna can be placed on a metallic surface.



FIGURE 5.1 ANTENNA REVERSE SIDE ADHESIVE

If the environment is too harsh, you can use non-adhesive products (Molex p/n:2158680011) to fix it with screws. (It is not recommended to add screws when using products with adhesive.)



FIGURE 5.2 ANTENNA HOLE

MOLEX DOES NOT RECOMMEND SCREW MODELS, BUT IT IS RECOMMENDED TO ADD A GASKET WHEN USING SCREWS.

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6.0 CHANGE HISTORY

REV	DATE	DESCRIPTION
A	2020/09/14	First Release
B	2021/07/15	Add material p/n:2158680011 (Antenna without adhesive)

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